

## IMAGE OUTPUT APPARATUS AND IMAGE OUTPUT METHOD

### BACKGROUND OF THE INVENTION

#### Field of the Invention

5           The invention relates to a server apparatus  
connected to a plurality of host computers and a  
plurality of image processing apparatuses having  
different image processing functions and different  
ejection processing functions through a network, an  
10   image processing apparatus for controlling a printer to  
which a paper ejecting unit which can communicate with  
the server apparatus can be attached, a data processing  
method, and a memory medium.

#### Related Background Art

15           In recent years, a print system for distributing  
and outputting a print job to a plurality of printers  
has been proposed.

For example, there has been proposed a print  
system constructed in a manner such that in case of a  
20   print job in which monochromatic (black/white:  
hereinafter, simply referred to as "B/W") pages and  
color pages exist mixedly, the print job is distributed  
to a B/W printer with respect to the B/W pages and  
distributed to a color printer with respect to the  
25   color pages, respectively, and those pages are  
outputted in parallel.

According to such a print system, an occupation

time of each printer can be reduced.

According to such a print system, however, since the B/W pages and the color pages are respectively outputted as a bundle of one set, there is a problem such that the user has to do work for rearranging a page order.

Since the user also has to do work for rearranging sheets printed by each of the color printer and the B/W printer in the page order, it is troublesome.

Particularly, in case of printing a large quantity of sheets, a time which is required for the manual work of the user is also considerably long. Therefore, it is demanded to save such a time with respect to the above problem.

#### SUMMARY OF THE INVENTION

The invention is made to solve the above problems and it is an object of the invention that in case of distributing a print job to a plurality of printers and outputting printed sheets, a burden on the user at the time when he does work for rearranging the distributed and outputted sheets is reduced.

According to the first aspect of the invention, there is provided a server apparatus connected to a plurality of host computers and a plurality of image processing apparatuses having different image processing functions and different ejection processing

functions through a network, comprising: obtaining  
means (corresponding to a main controller 102 shown in  
Fig. 1) for obtaining color output information and  
paper ejecting process resource information from each  
5 of the image processing apparatuses; receiving means  
(corresponding to a communication controller 101 shown  
in Fig. 1) for receiving a series of jobs in which B/W  
output pages and color output pages exist mixedly and  
which is requested by each of the host computers; and  
10 control means (corresponding to the main controller 102  
shown in Fig. 1) for analyzing the series of jobs  
received by the receiving means, distributing an output  
of each page on the basis of the color output  
information and the paper ejecting process resource  
15 information which were obtained by the obtaining means  
to the plurality of image processing apparatuses having  
the different image processing functions, and  
outputting the pages.

The above and other objects and features of the  
20 present invention will become apparent from the  
following detailed description and the appended claims  
with reference to the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

25 Fig. 1 is a block diagram showing a construction  
of an image forming system including image processing  
apparatuses and a server apparatus according to an

embodiment of the invention;

Fig. 2 is a block diagram showing a detailed construction of the image processing apparatus shown in Fig. 1;

5 Fig. 3 is a schematic diagram showing an example of a paper ejector shown in Fig. 1;

Fig. 4 is a schematic diagram showing an example of a paper ejector shown in Fig. 1;

10 Fig. 5 is a flowchart showing an example of a data processing procedure in an information processing apparatus according to the invention;

Fig. 6 is a flowchart showing an example of the data processing procedure in the image processing apparatus shown in Fig. 1;

15 Figs. 7A, 7B, and 7C are diagrams for explaining distribution of image data by a print server shown in Fig. 1 and an image output processing state by the paper ejector connected to each printer;

20 Figs. 8A, 8B, and 8C are diagrams for explaining distribution of image data by the print server shown in Fig. 1 and an image output processing state by the paper ejector connected to each printer;

25 Fig. 9 is a diagram for explaining a memory map in a memory medium for storing various data processing programs which can be read out by an image processing system to which the server apparatus and image processing apparatus according to the invention can be

applied; and

Fig. 10 is a flowchart showing the operation of a print server 100 in the second embodiment of the invention.

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#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

##### <First embodiment>

Fig. 1 is a block diagram showing a construction of an image processing system including image processing apparatuses and a server apparatus according to an embodiment of the invention. In the image processing system shown in the embodiment, one or a plurality of host computers 150 and a plurality of image processing apparatuses 110 are connected through an arbitrary network 140. The image processing system corresponds to a system in which a print server 100 having a bidirectional interface with each of the above apparatuses is connected to the network 140.

In Fig. 1, the print server 100 is connected to one or a plurality of host computers 150 through the network 140 by a communication controller 101 as shown in Fig. 1. The communication controller 101 receives print data which is transmitted from the host computers 150.

Reference numeral 102 denotes a main controller for temporarily storing the print data into a memory 103. With respect to a plurality of print data stored

in the memory 103, the main controller 102 performs a control for sequentially reading the print data and distributing them to each image processing apparatus 110 on the basis of information of the print data. The communication controller 101 sends each print data to the image processing apparatus 110 designated by the main controller 102.

Reference numeral 120 denotes a printer to which a paper ejector 130 such as a sorter is attached. The sorter has a sorting function for ejecting printed sheets to a different bin every number of sheets and a grouping function for ejecting the printed sheets of the same page to the same bin. As other functions, there are a staple function and the like.

The paper ejector 130 realizes a function such as shift, staple, sort, group, booklet binding, punch, or the like through a printer interface 118, which will be explained hereinlater, similar to an interface provided between the printer 120 and image processing apparatus 110.

Fig. 2 is a block diagram showing a detailed construction of the image processing apparatus shown in Fig. 1 and the same component elements as those in Fig. 1 are designated by the same reference numerals.

The image processing apparatus 110 is connected to one or a plurality of host computers 150 and the print server 100 through an interface 111 such as a network

or the like.

Reference numeral 113 denotes a CPU for performing a control such that the print data transmitted from one or a plurality of host computers 150 and the print  
5 server 100 through the interface 111 and an external interface circuit (external interface) 112 is temporarily stored into a spool area 115-1 provided in a hard disk 115, or the like.

The CPU 113 generates image data from the print  
10 data read out from the spool area 115-1 and writes it into an image memory 116-1 provided in an RAM 116. After that, the generated image data is read out from the image memory 116-1 and sent to the printer 120 via a printer interface (printer communicator) 117, so that  
15 a visible image is formed.

In the hard disk 115, a program area 115-2 is used for storing a program. The program in the program area 115-2 is transferred into a work memory 116-2 in the RAM 116 and executed by the CPU 113. A part of the  
20 work memory 116-2 in the RAM 116 and a work area 115-3 in the hard disk 115 are used as temporary work areas when the CPU 113 executes various controls. A CPU bus 114 connects each component element in the image processing apparatus 110 mentioned above.

25 The image data is generated every page from the print data stored in the spool area 115-1 in the hard disk 115. The print data of each page which is

generated as image data is transferred once into the work memory 116-2 in the RAM 116 from the spool area 115-1 in the hard disk 115 by the CPU 113 and subjected to a generating process. The image data is written  
5 into the image memory 116-1 in the RAM 116.

Figs. 3 and 4 are schematic diagrams showing examples of the paper ejectors 130 shown in Fig. 1. It is now assumed that the paper ejector 130 shown in Fig. 3 has a shifting function (a function for shifting the printed sheets every number of sheets and ejecting  
10 them, a function for shifting only the first printed sheet and ejecting it) as a function of a finisher and the paper ejector 130 shown in Fig. 4 has a sorting & grouping function as a function of the finisher.

A control procedure of the print server 100 shown  
15 in Fig. 1 will now be described hereinbelow with reference to a flowchart of Fig. 5.

Fig. 5 is the flowchart showing an example of a data processing procedure in the information processing  
20 apparatus according to the invention. S501 to S508 denote processing steps.

First, the print server 100 obtains color output information of the printer 120, that is, color output information regarding printer resources about whether  
25 the printer 120 and image processing apparatus 110 enable a color process or only a monochromatic (B/W) process to be executed (S501). The obtained color



output information is stored in the main controller 102 in the print server 100 (S502).

Information of the ejection function of the paper ejector 130 connected to each printer 120 is obtained (S503). As already mentioned in Figs. 3 and 4, information showing whether the finisher having the shifting function has been connected as a paper ejector 130 (the example shown in Fig. 3) or the sorter having the sorting & grouping function has been connected as a paper ejector 130 (the example shown in Fig. 4) is obtained. The obtained information of the ejection function is stored into the main controller 102 in the print server 100 (S504).

The print data sent from the host computer 150 comprises a print server address, a host computer address, a print information header, and image information.

A user ID and an emulation ID which is used by the image information are included in the print information header. The user ID is used for specifying the user who issued a print request in the host computer 150 in the case where a plurality of users such as workstations or the like can simultaneously use the host computer 150.

The image information is print image information such as character information, bit map image information, graphics information, or the like.

Further, in the embodiment, the print information header and the image information construct a pair, and the image information handles the whole data, as one unit, responsive to one print request which is issued by the user.

Subsequently, the print data sent from the host computer 150 is received by the print server 100 through the communication controller 101 (S505). The main controller 102 analyzes the image information in the received print data and discriminates whether each page is a color page or a B/W page (S506).

If the page is determined to be a color page, an ejection command is added to the print data and the resultant data is transmitted to the image processing apparatus 110 from which the color output information has been obtained and which can perform the color process (S507). The processing routine is finished.

If the page is determined to be a B/W page in step S506, an ejection command is added to the print data and the resultant data is transmitted to the image processing apparatus 110 which can perform the B/W process (S508). The processing routine is finished.

Fig. 6 is a flowchart showing an example of the data processing procedure in the image processing apparatus 110 shown in Fig. 1. S601 to S607 denote processing steps.

First, the image processing apparatus 110

generates the image data every page in accordance with the print data sent from the print server 100 (S601). When the generated image data is sent to the printer, the image processing apparatus 110 adds a command to  
5 the print information header so that the paper ejector 130 having the shifting function shifts the sheet (S602).

Similarly, a command is added so that the paper ejector 130 having the sorting & grouping function  
10 outputs the print sheets to the sort bin (S602).

The image data and the ejection command are sent to the printer 120 (S603). At this time, the image processing apparatus 110 regards the succeeding pages as one unit and sends the image data and ejection  
15 command to the printer 120.

After that, if the next page exists, whether it is a succeeding page or not is discriminated (S604). If it is determined that it is not the succeeding page, a changing process of the ejection function such that a  
20 sifting position of the finisher is changed or an output bin of the sorter is changed is executed (S605). The processing routine advances to step S606.

If it is determined in step S604 that it is the succeeding page, whether the number of pages exceeds  
25 the number of trays and the number of bins or not is discriminated by checking the information obtained from the printer 120 (S606). If it is decided that it does

not exceed the number of trays and the number of bins,  
the processing routine is returned to step S601. If it  
is decided that it exceeds the number of trays and the  
number of bins, the apparatus waits until the sheets on  
5 the tray and bin are cleared (S607). When they have  
been cleared, the processing routine is returned to  
step S601. That is, the image processing apparatus 110  
interrupts the generation and transmission of the image  
data to the printer 120. After it is detected that the  
10 sheets on the tray and bin have been cleared, the  
transmission of the image data is restarted.

As mentioned above, with respect to the pages  
whose succession was broken once, the shifting function  
of the paper ejector 130 having the shifting function  
15 is used, thereby making it easy to distinguish the unit  
of those pages from the previous unit.

The paper ejector 130 having the sorting &  
grouping function is controlled so as to output the  
sheets to the different bin, thereby making it easy to  
20 distinguish the unit of those pages from the previous  
unit.

Figs. 7A to 7C and 8A to 8C are diagrams for  
explaining distribution of the image data by the print  
server 100 shown in Fig. 1 and image output processing  
25 states by the paper ejector 130 connected to each  
printer 120 and correspond to a case where one printer  
120 is the color printer and its paper ejector 130 is

the sorter and a case where the other printer 120 is the B/W printer and its paper ejector 130 is the finisher, respectively.

Figs. 7A and 8A show constructions of the image data of page-1 to page-14 received by the print server 100. Figs. 7B and 8B show constructions of the pages which are ejected to each bin of the sorter of the printer. Figs. 7C and 8C show constructions of the pages which are ejected to the tray.

Depending on the construction of the image forming system, as ejecting states by the sorter and finisher as an option function, the ejecting states of the number as many as the number of combinations of Figs. 7B, 7C, 8B, and 8C exist.

The information of the print header can be also added in a manner such that a mode showing that the above processing procedure is used or a mode showing that the above processing procedure is not used can be selected on the print server 100.

The above adding process can be realized by providing a user interface (screen, operation panel, or the like) for the print server 100 and the user is allowed to select a desired mode.

According to the foregoing embodiment, in addition to the efficient distributing method of distributing the print data to each image processing apparatus, the technique which can sufficiently utilize the functions

of the paper ejector and solve the troublesomeness of the matching and sorting of the outputted sheets can be provided, and the image forming system having excellent operability can be realized.

5 <Second embodiment>

In the first embodiment, the image processing apparatus 110 discriminates the succession of the page numbers of the print data received from the print server, the control command for allowing the sheets to  
10 be sorted on a page unit basis of the succeeding page numbers and ejected to the paper ejector 130 is added to the print data, and the resultant print data is outputted to the printer 120.

In the second embodiment, before the print server  
15 100 transmits each print data to each image processing apparatus 110, the print server 100 discriminates the succession of the page numbers of each print data and inserts into each print data the control command for allowing the sheets to be sorted on an output page unit  
20 basis of the succeeding page numbers and ejected.

For example, a case where the print server 100 outputs the B/W pages in the print data to the B/W image processing apparatus and outputs the color pages to the color image processing apparatus is considered.

25 The print server 100 first discriminates the succession of the page numbers with respect to the B/W print data comprising the B/W pages. The print server

100 inserts into the B/W print data the control command for allowing the sheets to be sorted on an output page unit basis of the succeeding page numbers and ejected. After that, the server 100 outputs the B/W print data  
5 to the B/W image processing apparatus.

Subsequently, the print server 100 discriminates the succession of the page numbers with respect to the color print data comprising the color pages. The print server 100 inserts into the color print data the  
10 control command for allowing the sheets to be sorted on an output page unit basis of the succeeding page numbers and ejected. After that, the server 100 outputs the color print data to the color image processing apparatus.

15 Thus, the B/W pages and color pages which were distributed and outputted are sorted and ejected on an output page unit basis of the succeeding page numbers, respectively.

Fig. 10 is a flowchart showing the operation of  
20 the print server 100 in the second embodiment.

The operation of the print server 100 will be described hereinbelow with reference to the flowchart.

First, in steps S501 to S505, since processes similar to those in the first embodiment are executed,  
25 their description is omitted here.

In step S1001, the B/W pages of the print data received in step S505 is sent to the B/W image

processing apparatus. In this instance, the control  
command for switching the ejecting positions regarding  
the pages whose succession of the page numbers was  
broken once is added so that the sheets are sorted and  
5 ejected on an output page unit basis of the succeeding  
page numbers.

In step S1002, the color pages of the print data  
received in step S505 is sent to the color image  
processing apparatus. In this instance, the control  
10 command for switching the ejecting positions regarding  
the pages whose succession of the page numbers was  
broken once is added so that the sheets are sorted and  
ejected on an output page unit basis of the succeeding  
page numbers.

15 As control commands which are added to the print  
data in steps S1001 and S1002, sorting commands using a  
rotation ejection function for switching the sheet  
ejecting direction to "portrait" or "landscape" on an  
output unit basis in addition to the shifting function,  
20 grouping function, or sorting function are used.

The operation of the print server 100 in the  
second embodiment has been described above.

On the B/W image processing apparatus side and the  
color image processing apparatus side, there is no need  
25 to discriminate the succession of the page numbers of  
the received print data, the sorting command inserted  
into the print data by the print server 100 is



interpreted as it is by the printer 120, and the sorting and ejection are executed.

As mentioned above, in the second embodiment, since there is no need to provide any special devices  
5 for the image processing apparatus side, the image processing apparatus 110, printer 120, and paper ejector 130 can be also replaced with one general printer.

In this case, the general printer generates the  
10 image data from the print data received from the print server 100 and performs the sorting and ejection on the basis of the control command inserted by the print server 100.

A construction of a data processing program which  
15 can be read out by the image processing system to which the server apparatus and image processing apparatus according to the invention can be applied will now be described hereinbelow with reference to a memory map shown in Fig. 9.

Fig. 9 is a diagram for explaining the memory map  
20 in a memory medium for storing various processing programs which can be read out by the image processing system to which the server apparatus and image processing apparatus according to the invention can be  
25 applied.

Although not particularly shown, information for managing the programs which are stored in the memory

medium, for example, version information, names of persons who made the programs, and the like are also stored. There is also a case where information depending on the OS or the like on the program reading side, for example, icons for identifying and displaying the programs, and the like are stored.

Further, data which depends on the various programs is also managed in a directory. There is also a case where a program for installing the various programs into a computer and, in the case where the program for installing has been compressed, a program for decoding it, and the like are stored.

The functions shown in Figs. 5 and 6 in the embodiment can be also executed by the host computer by a program which is installed from the outside. In such a case, the invention is also applied to a case where information including the programs is supplied to an output apparatus from a memory medium such as CD-ROM, flash memory, FD, or the like or from an external memory medium through a network.

Naturally, the objects of the invention are also accomplished by a method whereby a memory medium in which program codes of software to realize the functions of the embodiments mentioned above have been recorded is supplied to a system or an apparatus and a computer (or a CPU or an MPU) of the system or apparatus reads out and executes the program codes

stored in the memory medium.

In this case, the program codes themselves read out from the memory medium realize the novel functions of the invention, and the memory medium in which the program codes have been stored constructs the invention.

As a memory medium for supplying the program codes, for example, it is possible to use a floppy disk, a hard disk, an optical disk, a magnetooptic disk, a CD-ROM, a CD-R, a magnetic tape, a non-volatile memory card, an ROM, an EEPROM, or the like.

Naturally, the invention incorporates not only a case where the functions of the embodiments mentioned above are realized by a method whereby a computer executes the read-out program codes but also a case where an OS (operating system) or the like which is operating on the computer executes a part or all of the actual processes on the basis of instructions of the program codes and the functions of the embodiments mentioned above are realized by those processes.

Further, the invention also incorporates a case where the program codes read out from the memory medium are written into a memory equipped for a function expanding board inserted into a computer or a function expanding unit connected to a computer, thereafter, a CPU or the like equipped for the function expanding board or function expanding unit executes a part or all

of the actual processes on the basis of instructions of the program codes, and the functions of the embodiments mentioned above are realized by those processes.

100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000